

REMARKS

Claims 6 and 7 are pending in the Application.

In Paragraph No. 2 of the final Office Action mailed September 19, 2006, claims 6 and 7 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 6,013,416 to Nozaki et al. ("Nozaki").

Applicants respectfully submit that this rejection should be withdrawn because Nozaki does not disclose or render obvious the positive type photoresist composition of the present invention.

Response and Statement of Substance of Interview

As discussed in the telephone interview of December 12, 2006, claim 6 pertains to a positive resist composition. The resist includes a resin having an ester group of formula (I-2) shown in the claim and which decomposes by the action of an acid to increase its solubility in an alkali solution. The resin further contains (1) a repeating unit having an alicyclic hydrocarbon moiety, and still further contains (2) a repeating unit having a group which is decomposed by the action of an acid to increase the resin's solubility in an alkali developing solution.

To the extent Applicants argued at the interview or elsewhere in the prosecution that the repeating unit (2) contains a group other than an alicyclic group which is decomposed by the action of an acid to increase the resin's solubility in an alkali developing solution, that argument is now modified and clarified. Rather, it is Applicants' position that the claim language stating that the resin "further contains" repeating structure units (1) "and further contains" repeating structure units (2) requires that the repeating units (1) and (2) be structurally different repeating

units. That is, the same repeating unit cannot satisfy both (1) and (2) within the context of the claim.

The resin also includes a photoacid generator. See claim 6.

Claim 7 depends from claim 6, and recites that the resin contains repeating structure units corresponding to a monomer represented by formula (II-2), which is a preferred embodiment of the resist composition of claim 6. See page 57, line 26 to page 58, line 3 of the specification.

Counsel noted that present claims 6 and 7 are related to embodiment (9) described at page 17 of the specification.

Counsel also noted that the alicyclic hydrocarbon moiety enhances resistance to dry etching. See the present specification at page 49.

Counsel further noted that the repeating unit (2) having a group that is acid decomposable is described at page 51, line 19 to page 52, line 3 and page 69, lines 4-22 of the specification.

Turning to Nozaki, the Examiner relies upon Example 66 at cols. 68-69 and the description at col. 12 of Nozaki. Counsel pointed out that the copolymer of Example 66 of Nozaki contains a lactone-containing repeating unit and an adamantyl group-containing repeating unit, but lacks the presently recited repeating unit (2) having a group which is decomposed by the action of an acid to increase the resin's solubility in an alkali developing solution.¹ Counsel argued that the description at col. 12 of Nozaki does not fairly suggest the terpolymer of the present claims, on the basis that this description is highly generic and does not

¹ Alternatively, if Nozaki's adamantyl group-containing repeating unit is deemed to correspond to present repeating unit (2), it cannot also satisfy the requirement of a repeating unit (1) simultaneously.

clearly suggest a terpolymer having the particular repeating units specified in present claim 6. Counsel pointed out that Nozaki's "film-forming compound" need not even be a polymer, as described at col. 12, lines 5-7 of Nozaki. Thus, not only would one need to select a polymer as the film-forming compound, but one would need to select a terpolymer having the particular repeating units called for in the present claims.

Counsel further noted the description at col. 12, lines 32-42 of Nozaki, which states that:

When said film-forming compound is in the form of [a] copolymer, the copolymeric compound is preferably a copolymer containing said repeating unit containing the protected alkali-soluble group as the first repeating unit, and the repeating units of said copolymer other than said first repeating unit include a repeating unit containing an unprotected alkali-soluble group in a side chain thereof and/or a repeating unit containing in a side chain thereof an additional protected alkali-soluble group capable of being cleaved upon action of the acid generated from said photoacid generator.

Counsel argued that this description of Nozaki's copolymer does not fairly suggest the particular terpolymer of the present claims.

In sum, counsel argued that Nozaki does not render the subject matter of present claims 6 and 7 *prima facie* obvious.

Even if a *prima facie* case of obviousness could be established based on Nozaki, which it cannot, the positive type photoresist of the present claims provides unexpectedly superior results in comparison to Nozaki, which confirm the patentability of the present claims over Nozaki.

In this regard, counsel explained that a comparison of Examples 5 and 8 in the present specification provides evidence of unexpectedly superior results which rebut any *prima facie* case of obviousness and support the patentability of claims 6 and 7 over Nozaki.

Referring to page 4 of the Office Action mailed September 19, 2006, counsel pointed out that the Examiner appears to have considered “comparative Example 5” and the “comparative” Examples in the present specification, when Applicants intended the comparison to be made between Examples 5 and 8, recognizing that Example 5 is now a comparative example in view of the amendments to the claims. Thus, the Examiner’s statement that “the comparative examples exclude the lactone monomer and show an unexpected result over those copolymers which lack the lactone monomer of formula (I-2)” overlooked or misappreciated the comparison that Applicants are making.

The Examiner and counsel discussed Examples 5 and 8 and the results thereof as shown in Table 2 at page 156 of the specification in detail. As discussed, Example 5 used resin A2 made in Synthesis Example 16 at page 147, and Example 8 used resin D2 made in Synthesis Example 19 at page 149. Further, the monomers for resin A2 were tricyclodecanyl methacrylate/monomer[II-A’-2]/methacrylic acid, and the monomers for resin D2 were the same monomers as for resin A2, plus t-butyl methacrylate.

With regard to the results shown in Table 2, counsel argued that Example 8 (embodying the present invention) provides an unexpectedly superior sensitivity in comparison to Example 5 (which is now a comparative example). The relative sensitivity for Example 8 was 0.6, as compared to 1.0 for Example 5, indicating that the resist composition of Example 8 is much more sensitive than that of Example 5. Example 8 also provided somewhat better results (0.28 vs. 0.29) in terms of the minimum width of remaining thin lines, indicating that Example 8 provides slightly better adhesion. Counsel argued that Applicants have compared to a

comparative embodiment (Example 5) which is even closer to the present invention than Example 66 of Nozaki, because Example 66 of Nozaki employed a repeating unit with an adamantyl group as the alicyclic group, whereas both of Examples 5 and 8 employed a tricyclodecannyl group as the alicyclic group. The only difference between the two examples is that Example 8 included the t-butyl methacrylate, i.e., the repeating unit (2) of present claim 6.

The Examiner agreed that he had previously been looking at the wrong comparative example. However, the Examiner continued to question whether the evidence rebuts the *prima facie* case of obviousness. In this regard, the Examiner queried whether the methacrylic acid incorporated in resins A2 and D2 could affect the results. Counsel argued that the presence of this unclaimed component should make no difference, since the amount (1.7 grams as compared to much larger amounts for the other monomers) is small and the amounts are the same in each of resins A2 and D2.

The Examiner indicated that supplemental evidence of patentability could be helpful.

Supplemental Evidence of Patentability

As supplemental evidence of patentability, Applicants submit herewith a Declaration Under 37 C.F.R. § 1.132 of Mr. Kenichiro Sato, the first-named inventor of the present application. The comparative experiments reported in Mr. Sato's Declaration show that the positive type resist composition of claims 6 and 7 provides unexpectedly superior results in comparison to Nozaki. Mr. Sato's Declaration further supports the patentability of the present invention over Nozaki.

In his Declaration, Mr. Sato reports on experiments which compare Example a using a resin where a methacrylic acid unit is excluded from the resin D2 in Example 8 of the present application, with Comparative Example a' using a resin where a methacrylic acid unit is excluded from the resin A2 in Example 5 of the present application. The Example a and Comparative Example a' were prepared and evaluated in the same manner as in the Examples of the present application except for using the above mentioned resins. The Comparative Example a' has a closer constitution to the present invention than the compositions disclosed by Nozaki.

As seen from the comparison in the Declaration, the positive type photoresist composition recited by the present claims provides unexpectedly superior results in each of Sensitivity (1.0 vs. 5.0), Pattern Profile (rectangular form vs. T-top) and Minimum Width of Remaining Thin Line (0.32 vs. 0.50), by using the resin containing a lactone-containing unit of formula (I-2), a repeating unit having an alicyclic hydrocarbon moiety (1) and an acid-decomposable unit (2). Further, on taking into consideration the experimental data in the present Declaration using resins without a methacrylic acid unit, it is apparent that the methacrylic acid unit is merely a preferable embodiment, and is not an essential component.

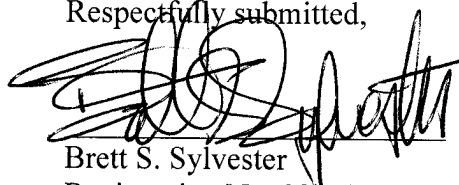
In view of the above, Mr. Sato states that, in his opinion, the superior results obtained by using a resin containing at least three repeating units of: the unit having a lactone group of formula (I-2), the unit (1) having an alicyclic hydrocarbon moiety, and the acid-decomposable unit (2) would have been unexpected to a person of ordinary skill in the art, in view of the disclosure of Nozaki.

In view of the above, reconsideration and withdrawal of the § 103(a) rejection of claims 6 and 7 based on Nozaki are respectfully requested.

Allowance is respectfully requested. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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